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Antidumping Protection and Markups of Domestic Firms:
Evidence from Firm Level Data

by Jozef Konings and Hylke Vandenbussche[1]

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Abstract

This paper tests whether anti-dumping (AD) protection affects the market power of import-competing domestic firms. To this end, we use a rich panel data set of about 4,000 EU producers that were involved in AD-cases, to estimate markups before and after the filing of a case. Using the Roeger (1995) method, our findings indicate that AD-protection has positive and significant effects on domestic markups, except in cases where import diversion after protection is strong, like in 'seamless steel tubes'. AD-filings without ensuing protection did not result in increased markups, suggesting that it is the 'protection' decision rather than the 'filing' decision that is required for rising markups. Our results control for potential endogeneity of AD-filings. A randomly drawn control group of firms not subject to AD-policy, did not have rising markups over the same period.

JEL-codes: F13, L13, L41
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I. Introduction

Over the last two decades, consecutive multilateral trade talks of the GATT/WTO have resulted in a general reduction of tariffs, voluntary export restraints and quotas. At the same time a rise in new forms of trade protection has occurred, in particular the use of antidumping (AD) measures has increased rapidly. The outlook for the future is that its use will continue to rise especially due to its recent popularity with developing countries (Prusa, 2001). In a recent review of the literature, Blonigen & Prusa (2001) indicate that since 1980, GATT/WTO members have filed more complaints under the AD statute than under all other trade laws combined. Moreover, an increased number of AD duties are now levied in any one year worldwide, than were levied in the entire period 1947-1970.

From an economic point of view, there seems to be a growing consensus that in many cases AD policy is an industrial policy tool in disguise. Rather than being targeted at keeping 'unfair imports' out, it is often aimed at fostering the interests of domestic producers (Lawrence, 1998), irrespective of the intent of importers[2]. However, in view of the industrial policy nature of AD measures, it is surprising that so little empirical work exists on measuring the effects of AD policy on domestic producers[3]. Most empirical work so far has focused on the trade and political economy aspects of AD protection and on the consequences for foreign producers[4]. In contrast, the focus of this paper is on the effects of AD protection on the domestic import competing industry. In particular, we look at how domestic producers' markups, defined as price over marginal cost, are affected after receiving AD protection. This seems a natural focus given that many existing theoretical models of AD have focused on domestic profitability and price setting behavior, which we will discuss in more detail in section II.[5] To test for changing markups as a result of AD protection, we will use the 1996 European AD cases and the domestic producers affected by them. Firm level data for the period 1992-2000 will allow us to estimate markups before and after AD protection for this group of domestic producers.

While we study empirically the effects of trade *protection* on markups, there exists a literature that has studied the effect of trade *liberalization* on the markups of firms. Levinsohn (1993) for Turkey and Harrison (1994) for Chile, find that markups mostly go down after trade liberalization. A similar result is found by Krishna & Mitra (1998) for India and by Botasso & Sembenelli (2001) for the European Union. Given that trade liberalization seems to discipline markups, we are inclined to expect, a priori, that trade protection will raise them.

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[2] Shin (1998) provides evidence that less than 10% of AD cases are about predatory intent, arguably the only economic rationale for protecting against dumped imports.

[3] A small number of papers have looked at the effects of trade policy on abnormal returns of domestic US producers using stock market data (e.g. Lenway et al., 1990; Hartigan et al., 1989 and Blonigen et al., 2002). These studies all identify potential excess returns from import relief.

[4] Empirically, a large range of trade aspects of AD have already been well documented like the inward FDI effects (Blonigen, 2002), trade restrictiveness (Staiger & Wolak, 1994; Prusa, 1997, Konings et al. 1999), retaliation aspects (Blonigen & Bown, forthcoming), pass-through effects (Blonigen & Haynes, 2002) and others. Also, the political economy aspects of AD have formed the subject of many studies including Finger, Hall & Nelson (1982), Tharakan & Waelbroeck (1994), Moore (1992) and Hansen & Prusa (1997).

[5] See e.g. Leidy & Hoekman (1990), Prusa (1994), Reitzes (1993) , Fischer (1992), Rosendorff (1996), Pauwels et al. (2001), Veugelers & Vandenbussche (1999), Vandenbussche & Wauthy (2001).

However, there are a number of reasons why the effect of AD cases on markups may not be unambiguously positive. While on the one hand an AD duty is likely to reduce imports from dumping countries, it may result in an increase of imports from non-dumping countries, as shown by Prusa (1997), Staiger & Wolak (1994) and Konings et al. (1999). If this kind of import diversion is substantial, domestic producers may find it difficult to raise markups after protection against dumped imports. At the time of the 'filing' of an AD case, it may not be easy to evaluate the extent to which import diversion will occur after protection or in other words, to what extent future benefits can be reaped. This largely depends on amongst others, the amount of spare capacity of non-dumping countries. Therefore, even if we should fail to observe a rise in markups after protection, this does not necessarily undermine the rational of filing for AD protection by domestic firms.

Another reason for expecting a differential impact of AD protection in different industries is related to the contestability of the import competing industries. Trade protection could trigger domestic entry and/or inward FDI which could dampen the increase of domestic markups. Due to data limitations we do not observe entry and exit of firms over the years.[6] But while these are important issues, they are likely to be more important under permanent tariff changes than under temporary tariff changes, like the AD type of protection studied in this paper (Head & Ries, 1999; Markusen & Venables, 1988). [7] These are just a few reasons for the differential impact of AD-protection on markups we can expect to observe in the different product groups/sectors affected by the 1996 AD cases that we study in this paper.

The methodology we use for estimating markups is based on Roeger (1995), which is very well suited if one has access to company accounts data, like we do. Roeger (1995), just like Hall (1988) argues that the presence of imperfect competition (i.e. prices exceed marginal costs) requires an adjustment in the Solow residual of total factor productivity growth. But, while estimations of markups based on a Hall (1988) type of approach are subject to a simultaneity bias, which is difficult to properly control for, Roeger (1995) develops a way to estimate price-cost margins in a consistent way. By subtracting the dual from the primal Solow residual this method overcomes the most important endogeneity problem inherent to the Hall (1988) type of approaches. We introduce this approach in section III. But while Roeger (1995) deals with one source of potential endogeneity, our analysis may be subject to another. By evaluating the effects of AD-cases on domestic firms' markups, there could be a selection bias since AD-filings may not be a random process. Therefore, we will correct our basic specification for that by applying a two stage Heckman procedure.

Our findings can be summarized as follows. In AD cases where the investigated product received duty protection, domestic firms experience an increase in markups. The increase in markups seems larger for firms involved in the 'initiation' of a case than for other protected firms. Also, single-

[6] In particular, the data we use has the following inclusion criteria. It consists of all EU companies that have to report full or abbreviated company accounts to their national statistical offices for which at least one of the following criteria is satisfied: total turnover of at least 1 million Euro, total assets of at least 1.5 million Euro or total employment of at least 10.

[7] Under EU Antidumping law, protection is limited to 5 years ('Sunset Clause'). The US has only recently put a limit on the duration of the protection. Prior to the Uruguay Round, AD protection could be indefinite. The only way protection could come off was through Administrative Reviews as documented in Blonigen & Haynes (2002).

product firms have larger increases in markups than multi-product firms. AD-filings that are 'terminated' without import relief, did not result in increased markups. These results are robust to business cycle effects that may affect the markups of firms, and to the inclusion of fixed effects which capture firm specific variables that are constant over time which could also affect firms' markups, like firm specific technology or sunk costs. A randomly drawn control group of firms not subject to AD protection during that same period, did not result in an observed increase in markups. This confirms the core result of our paper that the increase in markups for EU firms was due to the common EU AD policy rather than to an industry or time trend.

We feel our results could be important for the following reason. Increasing markups suggest a loss of allocative efficiency that has not been pointed out before and that could add to the general welfare cost of trade protection. Under the assumption that domestic firms are price-takers, Gallaway et al. (1999) have estimated the general equilibrium effects of US AD and Countervailing duty laws to lie around an annual 4 billion dollars of welfare loss. This paper would suggest that allowing for domestic product market imperfections could add to that number, making previous estimates of welfare costs an underestimate of the true welfare losses of trade protection.

The rest of the paper is structured as follows. Section II gives a brief theoretical background. Section III explains the methodology we apply and discusses the company data that we use. In section IV we discuss our findings both for the pooled data across AD-cases as well as on a case-by-case basis. In Section V we perform a number of robustness checks and Section VI is a concluding one.

II. Theoretical background

An AD duty is very similar to an import tariff. The effect of a tariff or duty on imperfectly competitive domestic industries has been analyzed extensively and the results all point in the direction of a rise in domestic prices as a result of a tariff on foreign imports. This positive effect of tariffs on prices is very robust across a wide range of oligopoly specifications (Helpman & Krugman, 1989) in the sense that it is one of the few results that holds both under the assumption of strategic complements (Bertrand) and under strategic substitutes (Cournot). Simply consider what happens in a duopoly model with a home and a foreign firm both selling into the home market. A duty on foreign imports when competition is in prices, results in an increase of the domestic price and the foreign price (Brander, 1995). Hence, duty protection implies that the home price will be higher under protection than under free trade. The same result holds under competition in output. A duty on foreign imports results in a higher output for the protected domestic firm and a lower output for the foreign firm, which ultimately results in a higher domestic price after duty protection. Based on these simple models we would then expect to find that European firms when protected by AD duties[8] have an increase in markups[9].

[8] In the EU, antidumping measures can either take the form of a duty or of a price-undertaking. While a duty is like a tariff, a price-undertaking is a voluntary price increase by the importers. Price-undertakings are also believed to raise markups (Belderbos et al., 2003).

A caveat that can be made here is that the models mentioned above, predicting an unambiguous rise in domestic prices after trade protection, are all static in nature. In recent years a number of dynamic models have been developed, taking into account that firms involved in AD cases may have incentives to behave strategically to influence AD outcomes (Fischer, 1992; Reitzes, 1993; Prusa, 1994). This implies that in the period before protection, prices can differ from what they would be under free trade. Empirical predictions on how prices move in the period just before protection are not straightforward since some models predict a pro-competitive effect while others predict an anti-competitive effect, depending on whether strategic substitutes or complements are assumed and depending on how the duty is determined (Pauwels et al., 2001). In contrast, second period results, when antidumping measures are actually imposed, are the same in all these models namely, domestic prices go up vis-à-vis free trade when a duty is imposed, resulting in a higher markup, while, in the absence of second period protection, markups do not change. It is on this result that we focus in the empirical analysis.

While the models listed above offer some guidance as to what we can expect a priori about the direction of markups, it is not our intention to test any of these models formally. Our purpose is to test for a structural break in the markups of domestic firms in our panel. The data we collected for this purpose have a number of features that should allow us to do so. First, we include both affirmative AD cases that resulted in a duty on the investigated product and non-affirmative AD cases that did not result in the imposition of duties. Second, we include a period prior to the duty 1992-1996 and a period after the duty 1997-2000, for the purpose of comparing average markups before and after protection. And third, we verify that markups did not increase for a randomly drawn control group of other domestic firms, not affected by the AD policy. In the light of the theoretical section above, we expect to find an increase in domestic markups in the affirmative AD cases, while in the non-affirmative cases, we do not expect a significant change in the markups of domestic firms.

III. Empirical Methodology and Data

III.1. Methodology

There are many alternative ways to estimate markups[10]. Any choice between them is likely to involve trade offs. A popular type of approach for estimating markups for individual industries is the structural approach introduced in Bresnahan (1989). But this requires information on unit prices and quantities to estimate the demand elasticities of the industry under consideration, which we do not have since our data consist of company accounts data of firms where typically one has information on sales figures but not on its unit price and output components.

[9] A few exceptions exist with respect to this general result. When demand is very convex, Cournot reaction functions can become upward sloping and the effect of a tariff on domestic prices can be different than the one described here. Also, a few papers have shown that tariff and quota protection in a dynamic context under certain conditions can result in more competition rather than less (Deneckere & Davidson, 1985)

[10] For an overview of methods to estimate markups with firm level data, see Tybout (2003).

The approach we follow in this paper is based on Roeger (1995), which is particularly well suited for working with company accounts data. This approach builds on Hall (1988) who showed that productivity growth as defined by output growth minus the growth of input factors weighted by their factor shares in output, can be decomposed into an imperfect competition term and a productivity term. Roeger (1995) offers an elegant way out of the most important endogeneity problem inherent to the Hall-approach that is caused by a potential correlation between 'unobserved productivity shocks' and the input factors of production. The basic intuition of Roeger is that both the primal and the dual Solow residual contain the same (unobservable) productivity term which will cancel out if one residual is subtracted from the other. This implies that markups can be estimated consistently without instrumentation. Another advantage of the Roeger-approach for estimating markups, is that input and output variables enter the regression in their nominal values, which overcomes the issue of finding good deflators. Especially in view of the high level of disaggregation we work on in this paper that is a welcome property, since most deflators on capital and sales are sector level deflators which introduce a lot of noise when applied to firm level data. Deflators for intermediate products, like materials, which we will be using as an input factor in addition to labor and capital, are even harder to find (Aw, Chen and Roberts, 2001).

However, Roeger's (1995) extension of Hall (1988) comes at a cost. In contrast to Hall, it assumes constant returns to scale in the production function. Not allowing for varying returns to scale may result in an upward or downward bias in the markup *levels* depending on whether returns to scale are respectively, decreasing or increasing, as shown by Basu & Fernald (1997) and Kee (2002). Basu & Fernald (1997), using U.S. manufacturing data, find firm level returns to scale to be constant or slightly decreasing. In view of that result, we would expect the Roeger (1995) estimates on firm level data, if any bias, to show an upward bias stemming from decreasing returns at the firm level. At first sight this bias in the levels estimates should not necessarily affect the *change* in markups, which is what we want to focus on in this paper. However, Tybout (1992) and Krishna & Mitra (1998) have shown that changes in trade regimes may have an effect on the returns to scale in production. They found that trade liberalization results in a reduction of the returns to scale. Therefore we can not exclude the possibility that AD-protection can change the returns to scale. In particular, in view of the literature on trade liberalization we would expect AD-protection to result in an increase in the returns to scale in which case the Roeger (1995) estimates are bound to be an underestimate of the true changes in markups. In sum, the constant returns to scale assumption could imply that our results are subject to an upward bias in the levels but, what is more important for the purpose of this paper, to a downward bias in the changes of markups.

Alternative ways to overcome the simultaneity bias inherent in the Hall (1988) type of approaches are the use of fixed effects estimations (Levinsohn, 1993) or instrumental variables (Harrison 1994). But both of them are subject to flaws. While fixed effects only control for time invariant firm level endogeneity, an instrumental variables approach is difficult since especially in micro-data, good instruments are hard to find. More recently a new fruitful approach has been developed to overcome the endogeneity problem between productivity shocks and input factors, notably Olley & Pakes (1996) (O-P). O-P has been successfully applied in for example Pavcnik (2002) in estimating productivity

changes following trade liberalization in Chile. One reason for not applying O-P in this paper is that our time span is relatively short and with O-P we would loose one additional year of data.[11] Another reason is that the method can only be applied to firms which have positive investment. Imposing such a restriction would yield an additional loss of observations.

In view of these trade offs, we decided that Roeger (1995) was our preferred method for the problem we want to study. We give a brief summary of the approach below. Consider a linear homogeneous production function F, where output of each firm i in year t is denoted Q_{it} and is a function of variable inputs, labor N_{it}, capital K_{it} and materials M_{it}.[12]

$$Q_{it} = \Theta_{it} F\left(N_{it}, K_{it}, M_{it}\right) \tag{1}$$

Firm output Q_{it} is a function of Θ_{it}, a firm- and period-specific multiplicative productivity shock. Under imperfect competition, the primal Solow residual, SR_{it}, as defined by the difference between the output growth and input factor growth weighted by their share in sales, can be decomposed in an imperfect competition term and a productivity term as follows:

$$SR_{it} = \frac{\Delta Q_{it}}{Q_{it}} - \alpha_{Nit}\frac{\Delta N_{it}}{N_{it}} - \alpha_{Mit}\frac{\Delta M_{it}}{M_{it}} - (1-\alpha_{Nit}-\alpha_{Mit})\frac{\Delta K_{it}}{K_{it}} = \underbrace{\beta_{it}\left(\frac{\Delta Q_{it}}{Q_{it}} - \frac{\Delta K_{it}}{K_{it}}\right)}_{imperfect\ \ competition} + \underbrace{(1-\beta_{it})\frac{\Delta \Theta_{it}}{\Theta_{it}}}_{productivity\ \ term} \tag{2}$$

where α_{Nit} is the cost of labor as a share of sales, $\alpha_{Nit} = \frac{W_{it}N_{it}}{P_{it}Q_{it}}$, where W_{it} stands for the firm level wage; α_{Mit} is the cost of material inputs in sales defined as, $\alpha_{Mit} = \frac{P_{Mit}M_{it}}{P_{it}Q_{it}}$, where P_M stands for the price of materials. Market power is captured by the coefficient, β_{it}, the Lerner index of firm i at time t, $\beta_{it} = \frac{P_{it} - c_{it}}{P_{it}}$, where c_{it} stands for the marginal cost of firm i at time t and P_{it} is the product output price. The Lerner index is related to the markup in the following way, $\beta_{it} = 1 - \frac{1}{\mu_{it}}$, where $\mu_{it} = (\frac{P}{c})_{it}$ is the price-cost markup. In (2), the output and input factors and the factor shares can be observed from the data, but the Lerner index and the productivity shocks can not. It is this Lerner index, or rather the price-cost markup that we want to estimate.

[11] O-P approximates the productivity shock with a polynomial in capital and investment where investment is defined as the difference in capital over two subsequent years.

[12] While Roeger (1995) uses two inputs, labor and capital, we add also material inputs. Not including intermediate inputs can lead to an upward bias in the estimated coefficients as shown by Oliveira-Martins and Scarpetta (1999).

The problem in estimating (2) is that the productivity shock, Θ_{it}, can be thought of as consisting of two parts

$$\Theta_{it} = \lambda_{it} + \psi_{it} \tag{3}$$

The second component in the disturbance term, ψ_{it}, is the unexpected part of the productivity shock that is not known by the firm and not known to the econometrician and that can be considered as just white noise. However, the first component in the productivity shock, λ_{it}, is known to the firm but not known to the econometrician and may be correlated with the use of input factors. This term is the source of a potential simultaneity bias, that, if not addressed by proper econometric techniques, results in inconsistent estimates of the coefficients in the production function.

One way to deal with the endogeneity problem in (2), without having to look for exogenous instruments, is proposed by Roeger (1995). Roeger argues that the dual Solow residual, consisting of factor and output prices, contains the same (unobservable) productivity term which will cancel out if the dual Solow residual is subtracted from the primal Solow residual, shown in (2). In order to show that, consider the decomposition of the price-based or dual Solow residual where *R* is the rental price of capital (for its derivation see Roeger, 1995)

$$DSR_{it} = \alpha_{Nit}\frac{\Delta W_{it}}{W_{it}} + \alpha_{Mit}\frac{\Delta P_{Mit}}{P_{Mit}} + (1-\alpha_{Nit}-\alpha_{Mit})\frac{\Delta R_{it}}{R_{it}} - \frac{\Delta P_{it}}{P_{it}} = -\beta_{it}\left(\frac{\Delta P_{it}}{P_{it}} - \frac{\Delta R_{it}}{R_{it}}\right) + (1-\beta_{it})\frac{\Delta\Theta_{it}}{\Theta_{it}} \tag{4}$$

The RHS of (4) where the Lerner-index, β_{it}, appears, looks quite similar to (2). By subtracting (4) from (2) we get

$$\begin{aligned} &SR_{it} - DSR_{it} = \\ &\left(\frac{\Delta Q_{it}}{Q_{it}} + \frac{\Delta P_{it}}{P_{it}}\right) - \alpha_{Nit}\left(\frac{\Delta N_{it}}{N_{it}} + \frac{\Delta W_{it}}{W_{it}}\right) - \alpha_{Mit}\left(\frac{\Delta M_{it}}{M_{it}} + \frac{\Delta P_{Mit}}{P_{Mit}}\right) - (1-\alpha_{Nit}-\alpha_{Mit})\left(\frac{\Delta K_{it}}{K_{it}} + \frac{\Delta R_{it}}{R_{it}}\right) \\ &= \beta_{it}\left[\left(\frac{\Delta Q_{it}}{Q_{it}} + \frac{\Delta P_{it}}{P_{it}}\right) - \left(\frac{\Delta K_{it}}{K_{it}} + \frac{\Delta R_{it}}{R_{it}}\right)\right] \end{aligned} \tag{5}$$

Note that in (5) the term, $(1-\beta_{it})\frac{\Delta\Theta_{it}}{\Theta_{it}}$, capturing the productivity shocks and causing the endogeneity problem in estimating (2) and (4) has cancelled out. This implies that estimation of (5) would in principle yield consistent estimates of the Lerner-index.

Instead of using the Lerner index, β_{it}, we can also rewrite (5) to obtain a direct measure of the price-cost markup, $(\frac{P}{c})_{it} = \mu_{it}$, by applying the transformation $\beta_{it} = 1 - \frac{1}{\mu_{it}}$. We then get,

$$\left(\frac{\Delta Q_{it}}{Q_{it}}+\frac{\Delta P_{it}}{P_{it}}\right)-\left(\frac{\Delta K_{it}}{K_{it}}+\frac{\Delta R_{it}}{R_{it}}\right)= \\ \mu_{it}\left\{\alpha_{Nit}\left[\left(\frac{\Delta N_{it}}{N_{it}}+\frac{\Delta W_{it}}{W_{it}}\right)-\left(\frac{\Delta K_{it}}{K_{it}}+\frac{\Delta R_{it}}{R_{it}}\right)\right]+\alpha_{Mit}\left[\left(\frac{\Delta M_{it}}{M_{it}}+\frac{\Delta P_{Mit}}{P_{Mit}}\right)-\left(\frac{\Delta K_{it}}{K_{it}}+\frac{\Delta R_{it}}{R_{it}}\right)\right]\right\} \quad (6)$$

Despite its apparent complexity, equation (6) can easily be estimated with firm level company accounts in order to arrive at an estimate for the markup coefficient μ. The single bracketed terms in (6) all refer to growth rates[13] of nominal values of output and input factors. Therefore the data requirements are limited to sales ($P_{it}Q_{it}$), the wage bill of workers ($W_{it}N_{it}$), the nominal value of the material costs ($P_{Mit}M_{it}$) and the nominal value of capital ($R_{it}K_{it}$).

For capital we used the book value of the fixed tangible assets from the balance sheet. For the rental price of capital (R_{it}) we followed Jorgenson and Hall (1967) and Hsieh (2002), or $R_{it} = P_I(r_t+\delta_{it})$, where P_I stands for the index of investment goods prices, measured at the country level, r_t stands for the real interest rate for each period t for the country the firm belongs to and δ stands for the firm level depreciation rate on fixed tangible assets (see data appendix for details on sources). The Profit & Loss account provided us the information on sales, the wage bill and material costs in consecutive years.[14]

In an attempt to simplify the expression in (6) we will denote the left hand side by ΔY_{it} which can be interpreted as the growth rate in sales per value of capital in firm i. The terms in between brackets on the right hand side of (6) will be denoted by ΔX_{it}, and can be interpreted as a composite variable that represents the growth rates in the various input factors weighted by their respective share in total sales. We then obtain the following expression for estimating the price-cost ratios $(\frac{P}{c})_{it} = \mu_{it}$.

$$\Delta Y_{it} = \mu_{it}\Delta X_{it} \quad (7)$$

We will build on (7) by adding a number of explanatory variables to explore the effect of AD-protection on the markup coefficient μ. The full model is given in (8) where we start by interacting the composite variable ΔX_{it} with an AD-variable. Initially we will use a simple AD-dummy and afterwards work with trade weighted duties. The AD-dummy has a value of 1 for the years during which AD protection applies (from 1997 onwards) in order to capture the change in markups as a result of protection. In addition, we also interact ΔX_{it} with yearly GDP growth per EU country k for the

[13] Note that $\frac{\Delta x_{it}}{x_{it}}+\frac{\Delta y_{it}}{y_{it}} = \Delta\ln(x)_{it}+\Delta\ln(y)_{it} = \Delta\ln(xy)_{it}$ which is the growth rate of xy.

[14] The Profit & Loss account for European firms can be compared to the Income Statement for US firms.

country where firm i is located. This way we control for changes in markups due to business cycle fluctuations, demand and time effects (e.g. Rotemberg and Woodford, 1991; Roeger, 1995). Our empirical specification can be written as follows

$$\Delta Y_{it} = \alpha_i + \mu_1 \Delta X_{it} + \mu_2 [\Delta X_{it} xAD] + \mu_3 [\Delta X_{it} xGDP_{kt}] + \beta_1 AD + \beta_2 GDP_{kt} + \varepsilon_{it} \quad (8)$$

where, μ_1, is the markup before protection, while μ_2 is the *change* in the markup during AD protection which is our main interest. The total markup during protection is equal to $\mu_1 + \mu_2$. The *change* in the markup ratio due to business cycle fluctuations is captured by μ_3; α_i is a firm level fixed effect to capture firm heterogeneity; β_1 and β_2, measure the direct impact of the control variables AD-protection and GDP growth in country k; and ε_{it} is a white noise error term. Strictly speaking, the error term, ε_{it}, should be zero given that the productivity shocks cancel out in the Roeger method. Measurement error is one potential source for a non-zero error term. But, arguably measurement error is likely to be lower in our case than in the Hall-type of approaches because of the use of nominal rather than deflated values. Also, measurement error present in both the SR_{it} and the DSR_{it}, will exactly cancel out. The remaining measurement error that our variables are likely to be subject to, will at least partially be controlled for by the fixed effects approach we use, provided that the measurement error is constant over time[15]. Roeger (1995) argues that the presence of excess capacity and labor hoarding, which are more likely to occur in recessions, results in a cyclical component in the error term, which can be captured by including a measure of demand in the regression like the growth rate of GDP, like we did in (8).

A number of additional remarks are in order here. First, the filing of an AD case may be non-random as shown amongst others by Blonigen & Park (2003). If not controlled for, our results on the basis of (8) could be subject to selection bias. Therefore, we will also report the results of a Heckman correction procedure applied to (8). This will be explained in more detail in section IV. Second, for empirical tractability we further need to make the assumption, as is done in all applications of this type (see Levinsohn, 1993) that the markups are the same for all firms within the same sector. It is not possible to estimate for each firm separately a markup because we would not have enough degrees of freedom.

In the empirical section we will first start by estimating markups, based on (8), for the pooled set of AD cases across ten different product groups involved in 1996 AD-filings. We also will report year by year estimates of the markup to trace its evolution over time. Afterwards we proceed by

[15] Measurement error is likely to be most severe in the capital variable. Rather than the input of capital in the production process, we measure the total stock of capital the firm is operating with. We do not observe the amount of excess capacity in any one year. The maintained assumption of instantaneous adjustment of the input factors may also be more difficult to defend for capital. Although we do observe in our data that capital does fluctuate yearly, we did experiment with specifications where we assumed capital to be fixed. Our results remained robust. In terms of the labor, we only observe the total annual wage bill and the total employment. Number of hours worked, would have been a variable with less measurement error in terms of the true input.

estimating markups on a case by case basis, where we let 'a case' coincide with a specific product group that came under AD investigation in 1996.

III.2. Data

The company accounts data we use is a commercial database sold under the name of AMADEUS[16] that runs from 1992-2000. This is a pan-European set of company accounts with harmonized entries for small, medium sized and large European enterprises. In view of the time dimension of this data, we decided to look up all AD-cases initiated in 1996. This allows us to have a number of yearly observations before and after the initiation of an AD-case. Or, in terms of equation (8) we split up the markup in two parts, the average markup before protection, i.e. the years 1992-96 and the average markup during protection, which starts one year after the initiation of an AD case, i.e. the years 1997-2000. We identified all the EU firms competing with imports of products that became the subject of an AD-investigation in the course of 1996. To identify these firms, we used the information published in the Official Journal about the case. In 1996, 26 new AD Investigations[17] were initiated, representing 12 different products or product groups. A product is very narrowly defined at the 8 digit CN-product classification[18]. Examples are 'Luggage and Travel Goods' and 'Seamless Steel Pipes and Tubes'. The novelty of our panel data lies exactly in 'matching' these 8 digit products mentioned in the AD-case, with the EU firms producing these products[19].

In Table 1 we list the 10 product groups for which we could retrieve all the variables from the unconsolidated company accounts, required for our analysis[20]. In column 2 of Table 1, we list the trade weighted duty in the protection cases that was obtained by multiplying the duty per country by the import shares of the individual dumping countries in the EU. In 6 cases the outcome was protection in the form of an AD-duty. In one other protection case 'Farmed Atlantic Salmon', the outcome was 'mixed' in the sense that some importers were subject to a duty and others subject to a price-undertaking. Given that price-undertakings only prevailed in one case, in our empirical analysis we did not distinguish between duty cases and price-undertakings cases[21].

[Insert Table 1 here]

[16] AMADEUS is a commercial dataset that can usefully be compared to COMPUSTAT data in the US, but in addition to the large and listed firms, our version of AMADEUS also includes small and medium sized enterprises.

[17] The initiation of a case concerning several countries is accounted as separate investigations/proceedings per country involved.

[18] Combined Nomenclature (CN) is a product classification scheme used by the European Union.

[19] In the data appendix we give more details on how this 'matching' was exactly carried out.

[20] We failed to find all the information required in two other cases. One was 'Briefcases & Schoolbags'. We could not separately identify EU firms that produced these products because they seemed to coincide with the firms producing 'Luggage & Travel Goods', another AD-case initiated in 1996. The other case that was not included was 'Ferro-siliconmanganese' where we could not identify the EU firms producing this very specific product.

[21] More price-undertakings cases would have made it possible to verify whether these price agreements lead to higher markup increases than duties. Price-undertakings are similar to VERs in their ability to facilitate collusion. The collusive nature of VERs was pointed out by Krishna (1989), and that of Price-Undertakings by Veugelers & Vandenbussche (1999).

Three cases out of the 10 were terminated without protection. A 'Termination' in the European AD policy means that while a complaint was filed by the European industry, the Commission after having looked into the case, decides not to impose protective measures, after which the case is terminated.

In the last column of Table 1 we show the total number of EU firms we identified for each case and the number of EU firms involved in the filing of the complaint to the EU. In most cases, but not in all, these 'initiating' firms are mentioned in the Official Journal, but their number is quite low compared to the total number of EU producers affected by protection. For clarification we point out that when the EU Commission decides to impose a duty it affects all exporters (current and future) of the country convicted of injurious dumping into the EU market. Also, when protection is decided upon, it applies to all EU-member states and can be compared to a 'common tariff' protecting the EU market as a whole and not just the EU firms that initiated the AD-complaint to the EU Commission.

A number of further remarks are in order here. First, the four year period we consider before the AD filings should in principle be long enough to guarantee that the average markup over this period is the 'free trade' one, and is not driven by any dynamic or strategic effects in the domestic industry. Second, while ideally, we would like to add AD cases from additional years, we believe 1996 to be a very average type of year in terms of AD-filings as suggested by Figure 1 that shows the number of AD-cases over time. While the number of initiations in 1996 lies slightly below the average number of annual initiations of 32 in the period 1992-2000, to our knowledge there was neither a sector bias in terms of the type of product under investigation, nor a country bias in terms of the defending countries involved in the year 1996. Therefore we would expect to find the same results when applying our analysis to AD-initiations in different years.

Third, we verified the existing tariff schemes of the products involved in the 1996 AD-cases to make sure that there were no changes in the EU's other tariffs in force on the product groups involved in our analysis. While most products were subject to positive EU import tariffs, no significant changes occurred in the period of our analysis.[22]

[Insert Figure 1 here]

[22] This can be verified from the EU's 'Taxation and Customs' website at http://europa.eu.int/comm/taxation_customs/dds/cgi-bin/tarchap?Lang=EN.

IV. Results

IV.1. Pooled Cases

Basic specification

We start by reporting results for the pooled sample, where we pool all EU firms affected by the 1996 AD cases together. In section IV.2 below we report the results for the case-by-case estimations. In Table 2 we list the results of our basic specification in (8) in column (1) for the AD filings that ended in 'Protection', and in column (2) for those that did not, the so-called 'Termination' cases. These results were obtained using a fixed effects specification that controls for unobserved firm heterogeneity that may affect markups such as firm specific technology, the amount of sunk costs, advertising outlays and time invariant political economy factors. The fixed effects specification is our preferred specification throughout the paper, but we have experimented also with random effects models, OLS and robust regression which all yielded the same qualitative results but are omitted here for brevity.[23] Both the AD-dummy and the GDP growth variable were also included separately in the regression as control variables in addition to their interacted effects, but are not shown in Table 2.

[Insert Table 2 here]

In the first row of Table 2, we test whether the coefficient, μ_1, which is the *level* of the markup before the AD filing, is statistically different from 1. If so, this implies that the output price exceeds the marginal cost. We find the average markup before the filing decision in the 'Protection' cases in column (1) of table 2, to lie around 16%. The *increase* in markups during the protection period, given by the coefficient μ_2, is in the order of 8% points for the 'Protection' cases and highly significant at the 1% level. In column 2 of Table 2, we show the results for the Termination cases[24]. The average markup before filing lies around 26%. But for the Termination cases, we do not pick up any increase in the markups after 1997. The coefficient μ_3, controlling for the business cycle effect on markups, while negative is not significant in any of the cases. The mean of GDP growth in our data lies around 2%. The negative sign may reflect counter-cyclicality of markups that has been pointed out before (e.g. Rotemberg and Woodford, 1992).

[23] A Hausman test decided in favor of fixed effects over random effects, although results did not alter greatly between the two specifications. An F-test indicated that fixed effects were significant in all our specifications. In a previous version we also reported OLS and robust regression estimates and the changes in markups we obtained were quite similar.

[24] The seven Protection cases resulted in over 8,000 observations, while for the three Termination cases we have about 7,000 observations in our sample. This difference is due to data collection. The relatively large number of observations for the Termination cases stems from the fact that products in those cases were more homogenously defined and resulted in a higher number of EU firms that could be identified as producing these products than in the Protection cases where products were often more differentiated and more specific, resulting in a lower number of identified EU import competing firms producing them.

A number of potential concerns can be raised here. The positive effect of AD-protection on markups could be driven by a 'common Europe effect'. In order to exclude that possibility, we will construct a control group, consisting of ten randomly sampled products in Europe, to see whether the European producers of these products did also experience an increase in markups during that same period. Another potential bias in our results is that AD-filings may be subject to a selection bias. One way of verifying that is to look at the year-by-year evolution of markups. Selection bias is not likely to be an issue if the markups in the years before the AD-filing do not show an upward or downward trend. In addition to the year-by-year effects we will also test more rigorously for selection bias by applying a two-step Heckman procedure, where the first step consists of estimating the probability of AD-filing. Each of these concerns will be addressed in more detail below.

Counterfactual control group

In order to verify whether the positive and significant effect of AD-protection on markups is driven by a common' Europe effect' we need to make sure that for a control group of firms that were not involved in AD-filings during that same period, we do not find a rise in markups. For this purpose we randomly sample a control group of EU firms constraining the sampling to 10 sectors, different from the ones already in our data sample. In the sampling we controlled for two aspects. First, in order to have a sufficient number of observations in each product group, we sampled sectors at the 4-digit NACE[25] level and second, we wanted to obtain sectors that were comparable to AD-sectors in terms of their 'openness'. The reason is that sectors with AD-filings are typically very open sectors in terms of their share in extra-EU imports, which can already be seen from Table 1, but is a more general property of sectors filing for AD protection.[26] Therefore we ranked the 235 NACE 4-digit sectors according to openness in terms of extra-EU import shares in the year 1996. We constrained the random sampling of firms for our control group in the top 25 % of these sectors, clustered around 10 different product groups, but excluding those sectors that had been subject to AD filings in the past. The randomly selected products are listed in the bottom half of Table 6 and include products like 'Metal Structures' and 'Processing of meat'. The results of our basic specification in (8) on the pooled sample of these randomly selected product groups are shown in the third column of Table 2. This resulted in about 15,000 additional observations. The μ_1 coefficient, giving the level of the markup before 1996 for the total control group of firms, is in the order of 21%. But the μ_2 coefficient capturing the change in markup after 1997 is negative but not significant. This suggests that for the firms in our control group we fail to find an increase in markups after 1997. This means that we have excluded the possibility that our previous result of an increase in markups for firms involved in an affirmative AD-case is due to some common 'Europe effect'. [27]

[25] NACE is the official EUROSTAT industry classification.
[26] For example, for EU AD-cases from 1984-2000, there is a strong positive correlation between 4-digit NACE extra-EU import shares and AD filings.
[27] In a previous version of this paper we also experimented with a control group composed of firms in the same industries as the ones filing for AD-protection but in countries 'outside' the EU-15 and not subject to AD-protection namely Norway, Switzerland and Iceland. For that control group we did not

Controlling for Selection Bias

A potential concern that may arise here is that the positive effect of AD- protection on markups reflects a selection bias where filing for AD-protection is not a random process but depends on certain firm and industry characteristics. Sofar we have treated the AD-filings as a natural experiment, but the political economy literature has indicated that AD-filings are often endogenous. [28] This implies that our estimates could be potentially biased. We use two approaches to check whether our results may be biased by selection issues. The first is a simple test in which we estimate the mark-up for every year. The second is a more rigorous approach where we perform a two-step Heckman estimation procedure.

In Table 3, columns 1-3 we report estimates of annual markups for the pooled 'Protection cases', the 'Termination cases' and the 'Counterfactual' respectively.

[Insert Table 3 here]

We illustrate this yearly evolution of markups in each of these groups in Figure 2. The pattern of markups before protection may reveal whether selection bias is an important issue. The yearly evolution of markups before protection as shown in Figure 2, is quite erratic up to 1996. After protection sets in, there seems to be an upward trend in markups. This pattern already seems to indicate that it is unlikely that the average increase in markups that we find in the 'Protection cases' is due to a self-selection of firms with rising profitability receiving AD protection. The evolution of the 'Terminations' is much more stable over time but without a clear upward trend afterwards. And finally for the firms in the 'Control group' a pattern emerges that is more similar to the 'Termination cases' than to the 'Protection cases'.

[Insert Figure 2 here]

While the evolution of markups give some support to the idea that the increased markup after 1997 in the 'Protection cases' seems to be driven by AD protection, a more rigorous test of selection bias may be desirable. In order to control for this potential selection bias, we will use a two-step Heckman procedure (Heckman, 1979). This requires that in the first step we estimate the probability of AD filing, using a maximum likelihood estimation procedure, in our case a probit estimation. The predicted probability of this first step is then used to compute the inverse Mills ratio, i.e. the ratio of the probability distribution function and the cumulative distribution function that is predicted from the probit estimation. This inverse Mills ratio is then used in the second step to control and test for sample selection. The second step regression is our basic specification in (8), but in which we add the inverse

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find a significant increase on firms' markups after 1996, confirming that we do not pick up a sector effect.

[28] This literature includes amongst others, Staiger & Wolak (1994), Krupp (1994), Knetter & Prusa (2000), Blonigen & Park (2001).

Mills ratio. Selection bias is present if the inverse Mills ratio is statistically different from zero (see Heckman, 1979; Greene, 2000 p 930 for details).

The probability of AD-filing was estimated using a random effects probit model similar to the approach in Blonigen & Park (2001). Our dependent variable in the selection equation gets a value of "1" if at least one AD-petition had been filed in one of the 4-digit NACE industries in a given year and a "0" otherwise[29]. For this purpose we collected information on all AD-filings between 1995-2000 at the 4 digit NACE sector level[30]. The variables that have shown to be most discriminatory between sectors filing for AD protection and non-filing sectors in earlier studies, include import penetration and industry employment. These will be included as explanatory variables, each lagged by one and three years, to allow for the fact that it may take some time to prepare a filing and also for the fact that the European Commission can consider evidence from three years before the petition. We further include their squares to allow for non-linearities. We also include sales growth lagged by two years to account for past profitability[31]. An additional reason for including the sales growth is that declining sales, together with rising import levels are often considered as most important evidence of injury by the European Commission, especially when the decline in sales occurs simultaneously with rising imports (Hansen and Prusa, 1997). Import penetration is expected to be positively correlated while sales growth is expected to be negatively correlated with AD-filings. We follow Blonigen & Park (2001) by also including the number of previous AD filings in a sector, to control for the fact that familiarity with the AD filing process is likely to reduce costs of future filings. Finally, we include year dummies to control for macro-economic unobserved shocks such as business cycles or exchange rate fluctuations, which can have an important effect on the number of AD filings as shown by Knetter & Prusa (2000).[32]

The results for the selection equation are given in Table 4. We find a non-linear effect of import penetration. In particular, import penetration lagged by three years has a positive and statistically significant effect on AD-filings, while its square has a negative and significant effect, similar to the results in Blonigen & Park (2001). In contrast, industry size, measured by employment, is not significant, while lagged sales growth is negative and significant. The latter suggests that depressed demand is an additional trigger for filing for AD. The number of 'previous filings' in the sector has a strong positive impact on the probability of filing, which is consistent with the hypothesis that

[29] Each AD case refers to a particular 8-digit CN code, which we aggregated up to its corresponding 4-digit NACE code. In some 4-digit NACE industries there occurred more than 1 AD filing, in total there were 128 petitions and 95, 4-digit industries that had an AD filing between 1995 and 2000.

[30] The choice of this period was inspired by the fact that for some explanatory variables we needed lags up to three years and some of these variables were constructed on the basis of the AMADEUS data that run only from 1992 onwards.

[31] We also experimented with other lag structures for the explanatory variables, not discussed here for brevity as they turned to be insignificant.

[32] Most of the explanatory variables (imports, employment, sales) are only available from EUROSTAT at the more aggregated 2-digit NACE industry level instead of the 4 digit level. For this reason we decided to construct our own measures of these variables. The import data were obtained by aggregating the 8-digit product level import figures to the 4 digit NACE sectors. The employment data were obtained by using firm level AMADEUS data and aggregating all firm level employment measured in terms of 'number of workers' to the 4-digit NACE level. Also sales data used to compute sales growth at the sector level were computed from the AMADEUS data set. The number of previous filings refer to all AD-filings in the EU between 1985 and 1994 (294 in total).

familiarity with the AD filing procedure reduces costs of future filings. [33] The second step in the Heckman selection model consists of correcting our basic specification in (8) for the probability of self-selection, in our case the probability of AD-filing. The results for the Heckman correction are reported in the last column of Table 2. We note that for the pooled sample of firms the price-cost markup is now estimated at about 18% and its increase after AD protection is estimated at almost 9% points, which very is similar to the results under the fixed effects specification in column (1). Furthermore, we can note that the inverse Mills ratio is not statistically significant different from zero, which suggests that in our basic specification is not subject to selection bias.

[Insert Table 4 here]

Using AD Duty Levels

The main point of the analysis sofar was to bring out the effect of AD-protection on EU import competing firms' markups. We did this somewhat roughly by using an AD-dummy variable in our specification. In this section we proceed by replacing the AD-dummy with the trade weighted AD duties in the Protection cases. To get at a duty level per case is not always straightforward. While some cases have ad-valorem duties, others have specific duties or a combination of both. Exporters that co-operate during the AD-investigation by the EU Commission usually get reductions from the country specific duty level. One case 'Farmed Atlantic Salmon' in our sample was a 'mixed case' where some exporters were granted a more favorable treatment by the Commission where the Commission accepted price-undertakings. In contrast to duty levels, the extent to which foreign producers offer to raise prices in the case of price-undertakings is not revealed in the Official Journal of the European Commission. Another difficulty is that in cases involving multiple defending countries, each country gets a different duty level. Also, differences may arise between the level of provisional and final duties.

Despite this variety of duty levels we tried to be consistent across cases when constructing a trade weighted duty. For each case we weighted the country wide final duty levels with the import share of that particular country into the EU. Specific duties were transformed in ad-valorem duties. In the mixed case we simply assumed that the price-undertaking was equivalent to the country wide duty level that was imposed on the foreign exporters that did not obtain the price-undertaking.

Averaging the trade weighted duties over all cases gave us a duty level for the 1996 protection cases of about 20% with a standard deviation of 0.12. This may seem low compared to estimates for the US.[34] However, EU duties in general tend to be lower than US duties. One of the reasons is the 'lesser-duty-rule' that prevails in the EU but does not apply in US AD policy. Under the 'lesser-duty-rule' in the EU, the AD-duty is the smaller of the dumping and injury margin, where in the US the AD-

[33] We also experimented with some other specifications, not reported here for brevity. One experiment we undertook was where we used the import share of a particular 4-digit industry in total imports instead of import penetration. We also experimented with replacing industry sales growth with the Herfindahl index of concent ration as an alternative proxy for industry profitability. These other specifications did not affect our ultimate Heckman correction result and so we stuck to the specification reported here as it is closest to the one used in the literature.

duty is always based on the dumping margin. This lesser-duty-rule often applies in the EU and for all the AD-cases with an injury margin smaller than the dumping margin, the tariff will be lower than what it would have been in the US.

In Table 5 we show the results for all AD-protection cases pooled, using the actual trade weighted duty levels. The average markup across products is about 16%, comparable to what we had in table 2 using the AD-dummy. The change in markup coefficient is equal to 0.302 and statistically significant. The effect of the duty evaluated at the average duty level is 0.302x0.20 = 0.061 or about 6% points which compares quite well with the 8% points increase obtained with the AD-dummy. Another interpretation that can be given here is that a 10% points increase in the AD-duty level is associated with an increase in the markup of 3% points (0.1x0.302= 0.03). While 3% points increase in markups may not seem all that big, we have to keep in mind that this result is based on pooling all EU firms together across AD cases. In section IV.2, where we discuss the results for the individual AD-cases, it will become clear that in some industries the positive changes in markups can be quite large ranging between 5% and 30% points or more. Note also that in Table 5 we now have a negative and significant effect of GDP growth on markups. The effect on markups evaluated at the mean GDP growth of 2% in our sample, amounts to a reduction in markups of less than 1% points.

[Insert Table 5]

Import Diversion Effects

AD-protection usually results in a reduction of the imports of the dumping countries in the AD case, as shown by Prusa (1994). In order to check to what extent markups vary with imports of dumping countries, we include in our basic specification the 'log of imports in tons of the dumping countries' instead of the AD-variable. [35] We expect a negative sign for this interaction term in the sense that when imports of the dumping countries fall after protection, we expect to see domestic markups go up. Of course, the extent to which markups will be able to rise after protection will amongst others depend on the amount of trade diversion that will take place from the dumping to the non-dumping countries supplying the EU. To capture the idea of trade diversion, we also include in our basic specification an additional interaction term with the 'log of imports on the non-dumping countries'. Here we also expect a negative sign of the coefficient of the interaction term. If trade diversion takes place, the non-dumping countries start exporting more to the EU market, putting downward pressure on the domestic markups. Therefore, from the interaction term with non-dumped imports in our basic specification, we expect a negative sign on domestic markups. However, if trade diversion does not take place and therefore imports of the non-dumping countries remain relatively

[34] The average dumping margin for the US is around 65% (Blonigen, 2003).
[35] Dumping and non-dumping countries were identified from the case reports in the Official Journal. The product level import figures were obtained EUROSTAT, annual intra-and extra-EU trade, version 2001.

stable, we would not expect to find any significant effect of the non-dumping imports on domestic markups.

We keep the interaction with GDP growth to account for macro shocks in each of the EU countries where firms involved in AD-filings are located which may affect markups. The results are reported in column 3 of table 5. The 'log of imports of dumping countries' has a negative and significant effect on markups, while the 'log of imports of the non-dumping countries' has a negative but no significant effect on markups. The negative sign for both interaction terms corresponds with our prior expectations. While the negative effect of the imports of the dumping countries is significant, the effect of non-dumped imports on markups is not statistically significant. This suggests that trade diversion is far from complete in the AD cases we consider. However, the inclusion of imports may result in an endogeneity bias, therefore in the final column we also run a specification where we lag imports of the dumping and of the non-dumping countries by two years, but the results do not change. The dominant effect on markups is the imports of the dumping countries. The results we report here of increased markups after protection, therefore seems to be consistent with the finding of relatively low import diversion in the EU as a result of AD protection (Konings et al. 1999).

IV.2. Individual Cases

We now turn to the ten different products in which the AD investigations took place. As explained before, the import competing industries are defined as those EU firms producing a similar product like the one under AD investigation. The markups and the change in markups are presented in Table 6 and are derived using a fixed effects model. In table 6 we start by listing the results for the 7 AD-cases where a duty was imposed, the 'Protection' cases, the 3 cases where no duty was imposed, the 'Termination'-cases and finally, in the bottom half of the table we list the results for the randomly selected 10 products groups in the control group, not involved in AD-filings.

In the first column of table 6, we report μ_1, the average price-marginal cost ratio (P/c) before filing in each of the Protection cases, Termination cases and Control group for the period 1992-1996. [36] In the second column we report μ_2, the average changes in markup (P/c) during the period 1997-2000. The third column of table 6 shows the number of observations for each case consisting of the number of firm-years. The final column gives an overall fit of the regression where we have also included the same set of control variables as we had before.

[Insert Table 6 here]

[36] Mark-ups in Europe tend to be higher than in the US. A study by Oliveira-Martins & Scarpetta (1999) comparing mark-ups in the manufacturing sector in the US versus the EU over a period of 20 years finds US mark-ups in the range of 10-15%, while European mark-ups are in the range of 15 to 30%. The European figures correspond quite well with the magnitude of the mark-ups we find for our set of European industries.

In all but one of the affirmative AD-cases we find the change in the average European markup as a result of AD-protection to be positive and significant, with markup increases ranging between 5.5% points in the case of 'Leather Handbags', to 36% points in the case of 'Bed linen'. The exception to the general increase in markups due to AD-protection is 'Seamless Steel Pipes and Tubes'. For the EU firms producing these 'Steel tubes', we do not find any effect of AD protection on the average markup across all firms in that product group, despite the relatively high trade weighted duty level of 27.9% applying in this case. This failure to observe a positive correlation between the size of the duty and the increase in the markups can be the result of several factors. Import diversion and the multi-product nature of our data may account for that. In the case of the 'Seamless Steel Tubes' part of the answer clearly lies in the substantial trade diversion following the protection decision as illustrated in Figure 3. There we show the evolution of dumped imports, non-dumped imports and the sum of the two which is total extra-EU imports in tons in the 'Seamless Steel Pipes and Tubes' case. While after 1996, the dumped imports fall, there is a simultaneous increase in the imports of the non-dumping countries, leaving the total extra-EU imports of 'Seamless Steel Pipes and Tubes' almost the same as before protection. This substantial trade diversion is likely to have prevented the domestic EU market for 'Seamless Steel Pipes and Tubes' from raising their markups.

[Insert Figure 3 here]

Quite a different story is occurring for example in the 'Leather Handbags' case. While imports of the named countries fell after 1996, the imports of the non-named countries remained at the same level as before the protection as shown in Figure 4. There was clearly far less trade diversion going on, if any. As a result, far less imports entered the EU market after 1996, no doubt relaxing the competition on the EU market and allowing domestic EU markups to rise by 5.5% points over and above the 23% markup that already prevailed in the market before protection.

[Insert Figure 4 here]

The 'Farmed Atlantic Salmon' industry in analogy with the 'Seamless Steel Pipes and Tubes' industry had low markups before protection. In contrast to the Steel Tubes case where no increase in the markup followed the AD-protection, markups on Farmed Atlantic Salmon rose by 12.9 % points after protection. One explanation surely lies in the fact that the only country named in that case, Norway had an import share of around 90% of total EU imports. It is not surprising that trade diversion in that case was not occurring. The low levels of markups before the AD-case may have resulted from fierce competition between the Norwegian Salmon and the predominantly Scottish 'Farmed' Atlantic Salmon on the EU market. The absence of trade diversion in this case may partly explain the rising markup after protection.

The 3 Termination cases, 'Synthetic Fibre Ropes', 'Luggage & Travel Goods' and 'Video Tapes' where EU producers of the importing competing product applied for AD-protection in 1996, but no duties were imposed, are also shown in Table 6. While positive markups prevail in these sectors

before the AD filings, we fail to find a significant increase in markups after 1996. This suggests amongst others that changes in markups are driven by the outcome of a case and not so much by the AD-filing decision.

And finally, we turn to a control group of 10 different product groups in the EU. Markups before 1996 in these sectors range between 13% in the case of 'Processing of Meat' to 34% in the case of 'Cement' and 'Outwear'. However, none of the product groups in our EU control group experienced a significant increase in markups after 1996.

V. Extra Robustness Checks

Do Initiators experience a markup bonus ?

A question that comes to mind is whether the EU firms initiating the AD-case are the ones that benefit most from the protection later on. While the law stipulates that at least fifty percent of the EU production of a particular product has to support the dumping complaint[37], some firms are more actively involved in the case petitioning than others. Since petitioning firms are more likely to incur costs related to the filing of a case, one would expect the benefits for petitioning firms to be larger than for other firms that get protected.

For this purpose we run our basic specification in expression (8) by adding an additional interaction with an 'initiator dummy' for EU firms that were actively involved in the initiation of any of the AD-cases filed in 1996. Because of the small number of initiating firms for each case, as shown in Table 1, the inclusion of the initiator dummy only makes sense in the regression based on the Pooled sample of AD-cases. In total we could identify 55 initiating firms that belonged to the sample of AD-cases in which initiators could be identified in 1996. The results for the pooled sample are reported in column 1 of Table 7. We find a positive and significant effect on markups for initiating EU firms over and above the markups other EU firms are realizing. On average there seems to be an additional 19% points bonus on markups from being an initiator. This result however should be treated with the necessary caution in view of this small number of observations on initiating firms.

[Insert Table7 here]

Do Single Product Firms experience a higher increase in markups ?

Our analysis is a firm level one, where the financial flows are not just the flows associated with the investigated product in the AD-case, but with all products within a domestic firm. Since we have no information on the importance of the investigated product in the case of multi-product firms, an AD-case with a higher duty need not necessarily be associated with a higher increase in the markup

[37] EU Regulation384/96 article 5.

following AD-protection. In a case where all or most firms are single-product firms, even with a smaller duty, the observed markup changes could be larger than in the multi-product case. Since most firms in our sample are multi-product firms, arguably our results are a lower bound estimate of the true rise in the markups at the product line. To support that intuition we will separate the single product firms across cases from the multi-product firms, and determine the markup change for each group separately. The results are shown in the last two columns of Table 7. Markups of single product firms protected by AD-duties rise about 14% points, while in the case of multi-product firms the change is 7% points. Hence, in those cases where we can identify the product line, firms experience an increase in markups that is about twice the size of the increase found for the multi-product firms. This suggests that our results are likely to be an underestimation of the true rise in markups at the product level.

Does measurement error cause potential problems?

A first additional concern relates to the potential endogeneity of ΔX in equation (8). Firms filing for protection may *expect* their prices to go up in the future which can affect input demands. Another source of endogeneity may come from measurement error in the input variables. To account for these two sources of endogeneity, we estimate equation (8) with instrumental variables (IV) using the general methods of moments estimator (GMM) proposed by Arellano and Bond (1991) (AB). This implies that we used as instruments all lagged values of ΔX starting from t-2 and before and estimate (8) in first differences to control for unobserved fixed effects. Table 8 shows the results. While the point estimates are quite different compared to those reported in Table 2, we continue to find a significant increase in markups in the 'Protection' cases, while no statistically significant increase in the 'Termination' and 'Counterfactual' cases. We note that the Sargan test confirms the instrument validity in all cases and that the second order serial correlation test (SOC) does not reject the model.

Dynamic effects in markups?

Another concern is that the methodology that we used so far did not control for any dynamics in the markups. For this purpose we turn to an alternative approach to measuring market power. As discussed by Tybout (2003) a common approach is to use the *observed firm level price-cost margin* (*PCM*), defined as sales net of expenditures on labor and materials over sales ($PCM_{it} = \frac{P_{it}.Q_{it} - P_{Mit}.M_{it} - P_{Nit}.N_{it}}{P_{it}.Q_{it}}$). We follow the literature and specify the following regression equation

$$PCM_{it} = \gamma_i + \gamma_1 PCM_{it-1} + \gamma_2 (K_{it} / P_{it}Q_{it}) + \gamma_3 AD + \gamma_4 GDP_{kt} + \varphi_{it} \qquad (9)$$

where γ_i is an unobserved firm level fixed effect and φ_{it} is a white noise error term. The lagged dependent variable is included to control for the possibility that price-cost margins are mean-reverting. As additional controls we include the capital-sales ratio, GDP growth in country k at time t, year dummies and case dummies. We estimate (9) in first differences using GMM and instrument the

lagged dependent variable PCM_{it-1} and the capital intensity variable with their lagged values dated t-2 and before, as they are not correlated with the first differenced error term. The results are shown in Table 9. The point estimates suggest that the firm level *PCM* is on average 4 percentage points higher after protection, while we find no significant increase in the firm level *PCM* in the 'Termination' cases or the 'Counterfactual'. This confirms that irrespective of the method that is used we find evidence of a positive effect on firm markups after AD protection.

VI. Conclusion

In this paper we document empirically the evolution of markups in import competing domestic firms in European Union AD cases. For this purpose we used company accounts data of around 4,000 European firms involved in ten AD cases initiated in the year 1996. The company accounts data run from 1992-2000, allowing us to study the evolution of markups both before and after AD filings. For this purpose we used the Roeger (1995) method. We found that for the pooled sample of firms in our data, markups of European firms is on average about 8% points higher during AD protection. On a case-by-case basis, we find AD protection to increase domestic markups by about 5 to 30% points, depending on the industry. In view of the methodology and the data we use this can be considered as a lower bound of the true rise in markups. Import diversion has a negative effect on markups and is more prevalent in some industries than in others. Single product firms and Initiating firms typically have a higher increase in markup after protection than other protected domestic firms.

In view of the institutional differences in the AD law and practice between the EU and U.S., it is not clear a priori, whether the same results would hold for the U.S.. The EU on average has lower duty levels than the U.S. as a result of the 'lesser-duty rule'. Based on the higher duty levels in the U.S. one would expect higher markups following AD-cases. Another reason for expecting larger effects on markups in the U.S. can be found in the Administrative Review process which gives foreign firms incentives to raise U.S. prices even more than the duty to reduce future AD-duties, as shown recently by Blonigen & Haynes (2002). However, the substantial trade diversion reported for the U.S. by Prusa (1994), could discipline markups more than in the EU, where trade protection seems more effective and trade diversion less strong (Konings et al., 1999). Hence, the final outcome on markup changes for the U.S. is difficult to predict. Therefore, this would make this an interesting avenue for future research.

Another avenue for future research could be the impact of AD-protection on employment and wages. In this paper we only considered effects on allocative efficiency in the sense that the markup increase is likely to reflect an increase in prices on the EU market after protection which has a negative impact on European consumer welfare. We did not investigate the potential impact of AD protection on employment and wages, which could also enter the welfare objective of the EU, as shown by Vandenbussche et al (2001). The empirical analysis of how markups may jointly be determined with wage setting in labor markets is therefore open to future research.

The results in this paper suggest also that trade policy may conflict with the objectives set out by competition policy. While our results do not point out whether firms are abusing their market power

or are acquiring a dominant market position due to AD protection, the results do indicate that markups go up, an observation which may be of concern for competition policy authorities.

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Table 1: European Antidumping Cases initiated in 1996

Product	**Trade Weighted Duty**	**Import share dumpers [(a)] In Tons '96**	**Number of EU firms in final sample[(c)]**	**Number of initiating firms**
Cotton Fabrics	19.6%	53%	136	5
Synthetic Fiber Ropes	Termination	14%	188	1
Luggage & Travel Goods	Termination	79%	1510	-
Leather Handbags	39%	46%	1120	2
Farmed Atlantic Salmon	4 % + PU[(b)] for some firms	88%	417	14
Seamless Steel Pipes and Tubes	27.9%	77%	114	8
Polyester Fibers Yarns	15%	17%	82	7
Bed Linen	16%	58%	21	13
Video Tapes	Termination	34%	21	_
Stainless Steel Fasteners	14%	72%	323	5
Total	19.75% (mean)	53.8% (mean)	3932	55

(a) $\frac{\textit{import tons of alleged dumping country(ies)}}{\textit{total extraEU imports in tons of product}}$

(b) Price-Undertakings (PU). For the trade weighted duty in this case we used 4% for all firms.

(c) The number of firms refers to the actual numbers used in the regression analysis. The initial number of firms retrieved was larger, but we lost firms due to missing observations on some of the variables needed in the analysis.

Table 2: Estimation Results for Pooled Cases

$$\Delta Y_{it} = \alpha_i + \mu_1 \Delta X_{it} + \mu_2 \left[\Delta X_{it} \times AD\right] + \mu_3 \left[\Delta X_{it} \times GDP_{kt}\right] + \beta_1 AD + \beta_2 GDP_{kt} + \varepsilon_{it}$$

	Protection Cases (1)	**Termination Cases (2)**	**Counterfactual (3)**	**Protection Cases, Correcting for Selection Bias[(a)] (4)**
	μ_1= P/c	**μ_1= P/c**	**μ_1= P/c**	**μ_1= P/c**
ΔX *(=composite explanatory variable of nominal inputs weighted by factor shares)*	1.163*** (0.010)	1.257*** (0.012)	1.213*** (0.007)	1.178*** (0.030)
	μ_2=Δ P/c	**μ_2=Δ P/c**	**μ_2=Δ P/c**	**μ_2=Δ P/c**
ΔX *interacted with AD-dummy(1 from 1997 onwards)*	0.079*** (0.013)	0.011 (0.015)	-0.006 (0.010)	0.087** (0.036)
	μ_3	**μ_3**	**μ_3**	**μ_3**
ΔX *interacted with annual country level GDP growth*	-0.086 (0.059)	-0.005 (0.070)	-0.036 (0.043)	-0.12 (0.154)
Inverse Mills Ratio	-	-	-	0.002 (0.003)
R^2	0.83	0.80	0.85	0.83
Number of observations	8708	7214	15591	8708

Notes: (a) The first stage Probability of AD-filings that controls for a potential selection bias in the regression in this column is based on a Random Effects Probit model. The coefficient μ_1 is the markup in the absence of protection and we test whether it is statistically different from 1. The parameter that captures the change in market power from 1997 onwards is given by μ_2. We test for it to be statistically different from zero. The significance of this parameter interests us most. Standard errors in brackets, ***/** denotes statistically significant at the 1%/5% critical level or lower. The mean growth of GDP over the period was 2%. As extra control variables we also included separately the AD-dummy and the annual country GDP per capita growth in the regression but results are not reported here. Standard errors in equation (4) were obtained by boostrapping the regression with a 1000 replications.

Table 3: Mark-Ups by year (Fixed effects)

	Protection Cases	Termination Cases	Counter Factual
	μ_1	μ_1	μ_1
1993	1.24 (0.04)	1.23 (0.04)	1.26 (0.02)
1994	1.06 (0.03)	1.25 (0.03)	1.21 (0.02)
1995	1.20 (0.03)	1.26 (0.03)	1.19 (0.02)
1996	1.10 (0.02)	1.23 (0.03)	1.20 (0.016)
1997	1.20 (0.02)	1.25 (0.02)	1.21 (0.016)
1998	1.23 (0.02)	1.26 (0.02)	1.18 (0.015)
1999	1.27 (0.02)	1.26 (0.02)	1.21 (0.015)
2000	1.26 (0.02)	1.24 (0.02)	1.23 (0.016)

Notes: Standard Errors in Brackets
These results were obtained by interacting ΔX with year dummies and excluding the interaction term with GDP growth in (8).

Table 4: Selection Equation
Dependent Variable : Probability of AD Filing (1 = Filing)
Random Effects Probit Model

Explanatory variables	Estimated coefficients
Import penetration (t-1)	-0.533 (0.56)
Import penetration (t-3)	0.63** (0.37)
Squared Import penetration(t-1)	0.04 (0.07)
Squared Import penetration(t-3)	-0.032* (0.02)
Log Sector employment (t-1)	-0.20 (0.21)
Log Sector employment (t-3)	0.01 (0.20)
Growth in Sector Sales (t-2)	-0.79* (0.50)
Number of previous cases (between 1984-1994)	0.155*** (0.02)
Year Dummies	Yes
Number of observations	1075

Standard errors in brackets, ***/**/* denotes statistically significant at the 1%, 5% and 10% critical level respectively.

Table 5: Estimation Results for Pooled Cases (Fixed Effects), using AD Duty levels

	Protection Cases **(1)**	**Protection Cases** **(3)**	**Protection Cases (using lagged imports t-2)** **(4)**
	μ_1= P/c	**μ_1= P/c**	**μ_1= P/c**
ΔX *(=composite explanatory variable of nominal inputs weighted by factor shares)*	1.163*** (0.008)	1.59*** (0.066)	1.74*** (0.09)
	μ_2=Δ P/c	**μ_2=Δ P/c**	**μ_2=Δ P/c**
ΔX *interacted with AD-Trade weighted Duty Level*	0.302*** (0.037)	-	-
ΔX *interacted with log of dumping imports*	-	-0.028*** (0.004)	-0.036*** (0.006)
ΔX *interacted with log of non-dumping imports*	-	-0.013 (0.010)	-0.018 (0.013)
ΔX *interacted with annual country level GDP growth*	-0.101* (0.058)	-0.198*** (0.058)	-0.30*** (0.077)
R^2	0.83	0.83	0.81
Number of observations	8708	8708	5934

Notes: F-test always confirms the presence of Fixed Effects at the firm level
The AD-duty and GDP growth and the log of imports in tons from dumping countries and from non-dumping countries have also been included in the regressions separately as extra controls in addition to their interactions but results are not reported for brevity.
The mean growth of GDP over the period was 2%.

Table 6: Results of Estimating Case-by-Case Market Power (Fixed Effects)

$$\Delta Y_{it} = \alpha_i + \mu_1 \Delta X_{it} + \mu_2 [\Delta X_{it} \times AD] + \mu_3 [\Delta X_{it} \times GDP_{kt}] + \beta_1 AD + \beta_2 GDP_{kt} + \varepsilon_{it}$$

Protection cases	**P/c before AD protection** μ_1	**Change in P/c during AD protection** μ_2	**Number of observations**	**R^2**
Cotton Fabrics	1.27*** (0.033)	0.065* (0.044)	777	0.86
Leather Handbags	1.237*** (0.011)	0.055*** (0.014)	5045	0.89
Farmed Atlantic Salmon	1.039 (0.030)	0.129*** (0.038)	1710	0.75
Seamless Steel Pipes and Tubes	0.993 (0.033)	-0.049 (0.047)	695	0.75
Polyester Fiber and yarns	1.088* (0.050)	0.191*** (0.075)	528	0.72
Bed Linen	1.61*** (0.064)	0.36*** (0.101)	151	0.90
Stainless steel fasteners	1.17*** (0.019)	0.091*** (0.023)	1610	0.91
Termination Cases				
Synthetic Fibre Ropes	1.19*** (0.026)	0.033 (0.034)	883	0.88
Luggage and Travel Goods	1.27*** (0.013)	0.007 (0.017)	6262	0.83
Video Tapes	1.38*** (0.175)	0.080 (0.24)	101	0.63
Counter Factual				
Processing of Meat	1.131*** (0.008)	0.000 (0.012)	2251	0.95
Processing of fruit and vegetables	1.175*** (0.026)	-0.005 (0.035)	1459	0.80
Grain Mill Products	1.132*** (0.020)	-0.016 (0.028)	1033	0.89
Wine	1.153*** (0.026)	-0.021 (0.032)	1470	0.84
Outwear	1.338*** (0.019)	0.020 (0.026)	3481	0.79
Inorganic basic chemicals	1.223*** (0.042)	0.067 (0.056)	659	0.77
Plastics in primary form	1.203*** (0.022)	0.033 (0.031)	218	0.86
Cement	1.344*** (0.044)	-0.074 (0.053)	978	0.80
Copper	1.217*** (0.039)	-0.105** (0.050)	637	0.83
Metal Structures	1.224*** (0.023)	-0.031 (0.030)	2228	0.80

Notes: Standard errors in brackets. *** indicates significance at the 1% level, ** at the 5% level.
For μ_1 we test for statistical difference from 1, which is equivalent to a consumer price that exceeds marginal cost.
We have used the AD-dummy for the interaction term with x.
For clarity we point out that with the Roeger-method we do not estimate the markup for each firm individually but we estimate an average markup for the firms in one particular product group.

Table 7: Robustness Checks

Dependent Variable: ΔY_{it} (see equation 8)

	Initiator Effect	**Single Product Firms**	**Multiple product firms**
ΔX *(=composite explanatory variable of nominal inputs weighted by factor shares)*	**μ_1= P/c**	**μ_1= P/c**	**μ_1= P/c**
	1.21*** (0.01)	0.929 (0.045)	1.169*** (0.011)
ΔX *interacted with AD-dummy*	**μ_2=Δ P/c**	**μ_2=Δ P/c**	**μ_2=Δ P/c**
	0.061*** (0.013)	0.14** (0.062)	0.075*** (0.014)
ΔX *interacted with AD-dummy interacted with initiator dummy*	0.196** (0.09)	-	-
ΔX *interacted with country GDP growth*	-0.082 (0.06)	0.20 (0.27)	-0.057 (0.063)
R^2	0.87	0.74	0.83
Number of observations	6997	475	8236

Notes: Standard errors in brackets, ***/** denotes statistically significant at the 1%/5% critical level or lower.

For μ_1, the coefficient that gives markups in the absence of protection, the statistical significance refers to statistically different from 1. The coefficient μ_2 gives the change in markups which we test for statistical significance different from zero.

Table 8: Estimation Results using IV Arellano-Bond GMM estimator

$$\Delta Y_{it} = \alpha_i + \mu_1 \Delta X_{it} + \mu_2 [\Delta X_{it} \times AD] + \mu_3 [\Delta X_{it} \times GDP_{kt}] + \beta_1 AD + \beta_2 GDP_{kt} + \varepsilon_{it}$$

	Protection Cases **(1)**	**Termination Cases** **(2)**	**Counterfactual** **(3)**
	μ_1= P/c	**μ_1= P/c**	**μ_1= P/c**
ΔX *(=composite explanatory variable of nominal inputs weighted by factor shares)*	1.05*** (0.11)	1.06*** (0.16)	1.213*** (0.18)
	μ_2=Δ P/c	**μ_2=Δ P/c**	**μ_2=Δ P/c**
ΔX *interacted with AD-dummy(1 from 1997 onwards)*	0.21** (0.13)	0.17 (0.20)	-0.33 (0.26)
	μ_3	**μ_3**	**μ_3**
ΔX *interacted with annual country level GDP growth*	1.12 (0.7)	-1.03 (0.91)	-2.8** (1.60)
Sargan Test of Instrument Validity (p-value)[(a)]	0.16	0.40	0.19
Test of second order serial correlation[(b)]	1.35	1.65	1.25
Year dummies	Yes	Yes	yes
Number of observations	4,468	3,368	9,645

Notes: ***/* denotes statistically different from zero at the 1%/5% critical level. Instruments include all available moment restrictions of ΔX starting at t-2 and before.

(a) Which asymptotically follows a χ^2 distribution.
(b) Which asymptotically follows a N(0,1) distribution.

Table 9: Price Cost Margin (PCM)-Method: First Differences GMM estimates

	Protection Cases	**Termination Cases**	**Counterfactual**
PCM_{t-1}	0.233*** (0.03)	0.215*** (0.04)	0.242*** (0.039)
Capital Intensity	-0.04*** (0.01)	0.022 (0.026)	-0.035** (0.016)
AD-Protection	0.04** (0.02)	0.001 (0.016)	-0.006 (0.016)
GDP growth	0.13*** (0.03)	0.098*** (0.03)	0.068*** (0.015)
Year dummies	Yes	Yes	Yes
Case dummies	Yes	Yes	Yes
Constant	-0.02*** (0.007)	-0.012*** (0.008)	-0.02*** (0.004)
Sargan Test	0.51	0.60	0.30
Test Second Order Serial Correlation	0.32	0.031	1.9
Number of observations	4,468	3,368	9,645

Note: ***/** denotes statistically significant different from zero at the 1%/5% level. Instruments include the moment restrictions on PCM and capital intensity at t-2 and before.

Figure 1: New AD-Initiations by year (1992-2000)

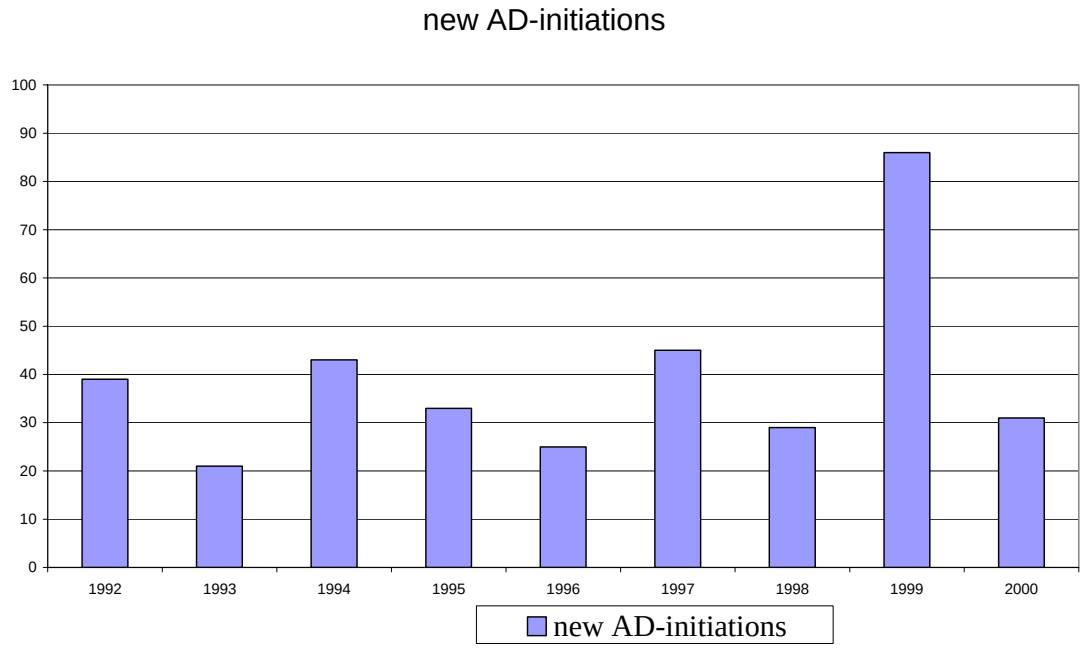


Figure 2: Evolution of Markups for the Pooled Antidumping cases

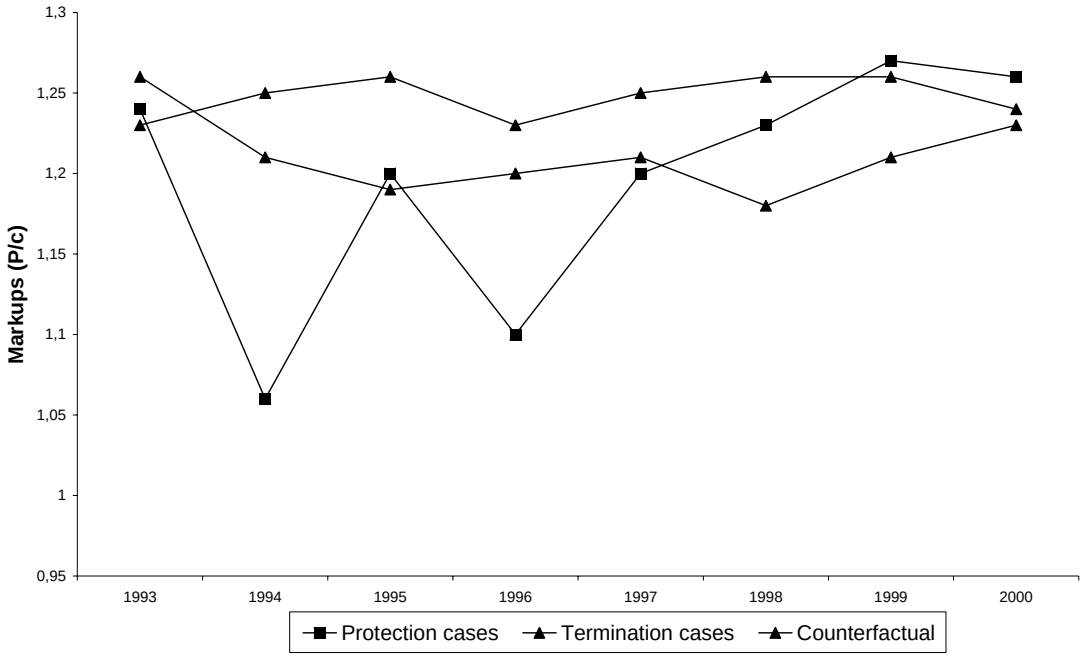


Figure 3: Evolution of Imports in tons in 'Seamless Steel Tubes Case'

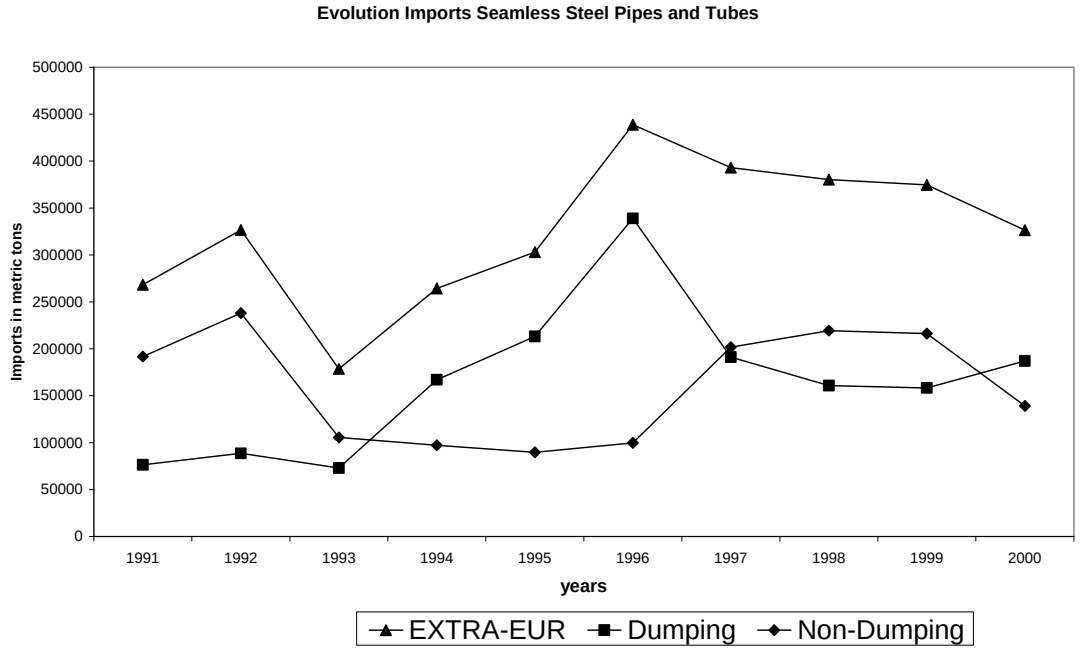
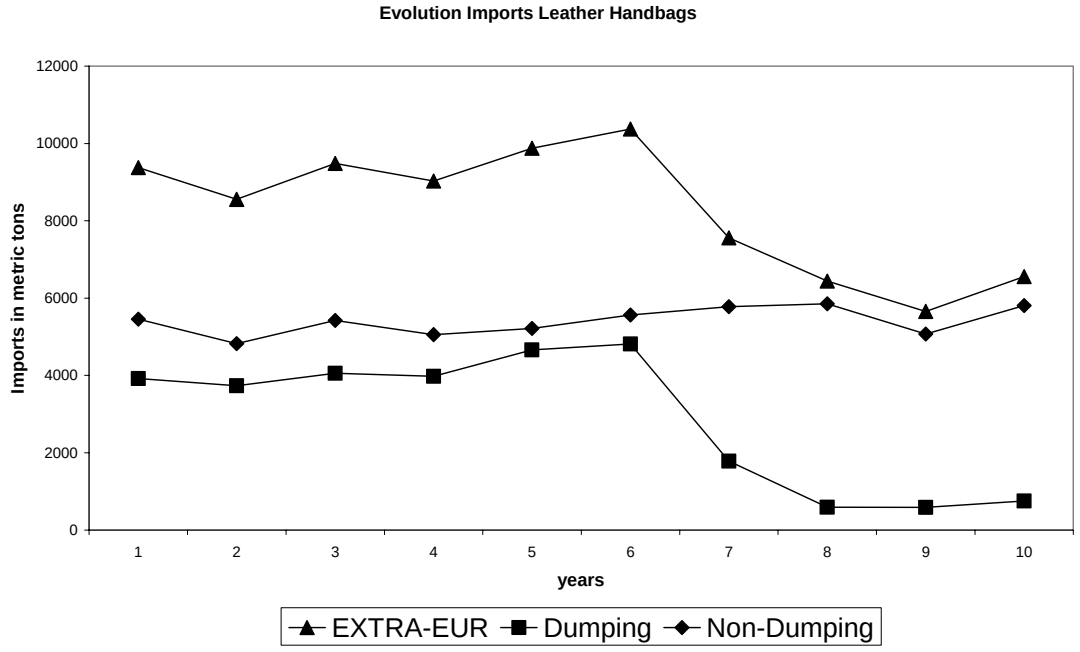


Figure 4: Evolution of Imports in tons in 'Leather Handbags'



Data Appendix

Construction of the data set

We took great care in trying to identify as closely as possible the import competing EU firms producing a similar product to the one subject to AD investigation. The 'matching' between the 8 digit product subject to AD-investigation that we obtained from the Official Journal, and the import competing EU firms could not be done by using a general 'algorithm' for all cases involved, but required a specific approach in almost every case as shown in the table below. Some of the reasons for this are outlined here. While each firm in our commercial database AMADEUS has a 'trade description', that description is often much wider than the product description mentioned in the AD-case. And while the AMADEUS-software allows a search of firms on the basis of this trade description, we were often unable to identify any EU firms producing the very specific product we were after.

Therefore in most cases, a different approach was required. The Official Journal usually, though not always, mentions also the names of the EU firms that initiated the AD-complaint. In 8 of the 10 AD cases that we considered at least one initiating firm was mentioned. On the basis of these company names we traced the initiating firms in AMADEUS and identified their 7 digit CSO activity code, the classification used in the AMADEUS company accounts dataset[38]. Most initiators were large firms with more than one 7 digit activity code. Our purpose was to look for the 7-digit CSO code(s) that corresponded most closely to the AD-product in order to consequently retrieve all EU firms in that same 7-digit activity line. One problem with this approach was that 7-digit Activity codes are only available for the medium and large sized enterprises, but are not reported for the small firms. For the small firms, AMADEUS does not provide information on their 7- digit activity/product lines, but only at a higher level of aggregation, like the 4-digit NACE code or the 6 digit NAICS code. So, we only based our search strategy on the 7-digit CSO code when despite missing out on all the small firms, a sufficient number of firms producing the AD-product could be obtained. In each case we also made sure that all the initiating firms were included. In cases where the search on the basis of 7-digit CSO yielded too few EU firms for meaningful analysis, we turned to the 6 digit NAICS activity codes of the initiating firms in order to identify the 6 digit NAICS code description best corresponding with the AD-product and then retrieved all EU firms in that NAICS category. By moving up one level of aggregation, we introduced somewhat more noise compared to the 7-digit CSO codes, but we gained many more observations because a search of EU firms on the basis of the 6 digit NAICS codes also included all the small firms.

And finally, when all other approaches were unsuccessful we turned to the NACE 4 digit codes reported by the initiators and retrieved all firms in that NACE classification. Eventually a case-by-case decision based on common sense was necessary. In table A1 we provide an overview of the search strategy applied in each case.

[38] The CSO code is an activity code that is used by the British Statistical Office and defines the activities of firms at a 7-digit level of detail.

Table A1: Search Strategies for putting the Data together

Name of the product	Search Strategy
Cotton Fabrics	5 initiating firms for which the following CSO codes were found: 4322007: Bunting, Cotton, Weaving 4322019: Cotton Weaving 4322028: Felt, Cotton, Weaving 4322030: Flag, Cotton, Weaving 4322034: Gaberdine, Cotton, Weaving 4322073: Weaving Cotton and Man-Mad Fibres
Synthetic Fibre Ropes	1 initiating firm identified, and the following CSO code found: 4396000: Rope, Twine and Net. We also experimented with a second strategy, by taking the 6-digit NAICS code: Rope, Cordage and Twine Mills, the results remained the same, irrespective of the search strategy. We report the results based on the CSO codes.
Luggage and Travel Goods	No initiating firms mentioned in the Official EU Journal We took the following 6-digit NAICS code: 316991: Luggage Manufacturing
Leather Handbags	2 initiating firms CSO code: 4410202: Fellmongery The CSO search strategy yielded too little EU firms for a sensible analysis, we therefore considered the 6-digit NAICS code: 316992: Women's leather handbag and Purse Manufacturing
Farmed Atlantic Salmon	14 initiating firms identified, which yielded the following CSO code: 112511: Finfish Farming and Fish Hatcheries
Seamless Steel Pipes and Tubes	8 initiating firms which yielded the following CSO codes: 2220016: Tube Steel Manufacturing 2220011: Seamless Tube Steel Manufacturing 2220008: Pipe Steel Manufacturing
Polyester Fibres Yarns	7 initiating firms yielding the following CSO activity codes: 2600012: Synthetic Fibre Manufacturing 2600011: Synthetic Man-Made Fibre Manufacturing 2600008: Polyamide Man-Made Fibre Manufacturing 2600009: Polyester Man-Made Fibre Manufacturing
Bed Linen	13 initiating firms, yielding the following CSO acitivity codes: 4557004: Bed Linen Manufacturing 4557005: Bedspread Manufacturing 4557006: Blanket making outside weaving In addition we added all firms which had in their actual trade description the word 'bed linen'.
Video Tapes	No initiating firms, but took the following 7-digit CSO code: 3452004: Video Tape Recording Manufacturing
Stainless Steel Fasteners	5 initiating firms, but based on the 7-digit CSO activity codes we ended up with a small number of firms. We therefore took the 4-digit NACE code, which in fact corresponds closely to the product under investigation: 2874: manufacturing of fasteners, screw machine products.

Measurement of the Variables for the ROEGER-estimations

The data required on output and input variables required in our analysis are: sales, wage bill, the value of the capital stock, and the cost of materials:

Sales ($P_{it}.Q_{it}$): We used the firm level operating revenue in each year provided in Amadeus.

Value of Capital ($R_{it} K_{it}$):

For Capital, K, we used the book value of tangible fixed assets for each firm in each year. For the rental price of capital, R_{it}, we followed Hall & Jorgenson, (1967)

$$R_{it} = P_I(r_{it} + \delta_{it})$$

P_I : the price index of investment goods for plant and machinery, measured at the country level. The data stem from the AMECO-database from the ECFIN department at the European Commission. We are grateful to Werner Roeger for providing this data.

r_{it}: stands for the real interest rate in each country. The data stem from the ECFIN department at the European Commission. We thank Werner Roeger for making these data available to us.

δ_{it}: stands for the firm level depreciation rate at time t. We experimented with various ways of measuring depreciation. The firm level depreciation, i.e. total depreciation divide by tangible fixed assets, resulted in unrealistically high depreciation rates for some firms. Therefore, we decided to apply a uniform depreciation rate of 10% for all firms. We also experimented with depreciation rates of 15 and 20% but these all yielded qualitatively the same results.

Wage Bill ($W_{it} N_{it}$): total wage bill in the firm consisting of the wages (W) times employment (N); source: Amadeus. Labor consists of production and non-production workers and wages consist of the sum of wages for all types of labor.

Cost of Materials ($P_{itM} M_{it}$): total material costs in the firm consisting of the price of materials (P_M) times materials (M); source: Amadeus.

GDP growth: growth rate in gross domestic product in each country; source: OECD *Main Economic Indicators*

Anti-Dumping Cases: source: 'The Official Journal of the European Union' various issues in the 'C-series' series' for notifications of case initiations and the 'L-series' for reports on the final decisions.

Data on Extra-EU imports: EUROSTAT annual intra-and extra- Trade statistics.